

# PATENT ABSTRACTS OF JAPAN

(11) Publication number : 05-036368

(43) Date of publication of application : 12.02.1993

---

(51) Int.CI.

H01J 35/10

H01J 35/06

---

(21) Application number : 03-213004

(71) Applicant : HITACHI MEDICAL CORP  
HITACHI DEVICE ENG CO LTD

(22) Date of filing : 31.07.1991

(72) Inventor : HARADA KEITARO  
DAN YOSHIHIKO  
KIZUYA MINORU

---

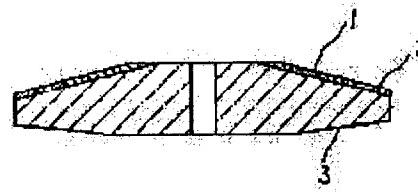
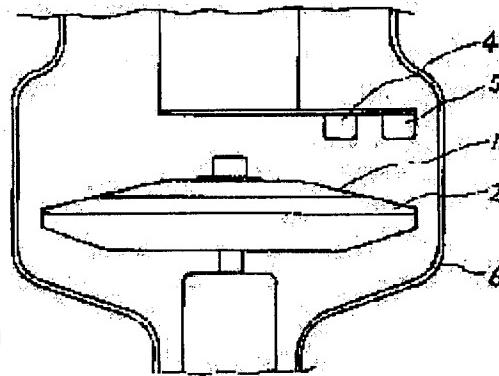
## (54) ROTATION ANODE X-RAY TUBE AND TARGET THEREOF

### (57) Abstract:

PURPOSE: To generate X-ray having the desired ray quality without enlarging a device by providing multiple different ring-shape focus surfaces on a target basic material, and selecting the focus surface in response to the use of photographing.

CONSTITUTION: Two kinds of doughnut-shape focus surfaces 1, 2 are bonded on a target basic material 3. An anode provided with a target and a part for supporting multiple cathodes are sealed inside of a vacuum case 6.

Cathodes 4, 5 are provided opposite to the focus surfaces 1, 2. Electron beam from the cathodes 4, 5 collides with the focus surfaces 1, 2 to generate X-ray. At this stage, the X-ray having the ray quality corresponding to the material of the focus surfaces 1, 2 can be generated. The X-ray having the desired ray quality can be obtained by providing a filter corresponding to each cathode and the material of the focus surfaces. furthermore, a shallow groove is provided in a part to be bonded, and since the focus surface 1 is fitted therein, contrast and image quality is improved without enlarging a device.



**\* NOTICES \***

JPO and INPIT are not responsible for any  
damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

**DETAILED DESCRIPTION**

---

**[Detailed Description of the Invention]****[0001]**

[Industrial Application] This invention relates to the target for rotating anode X-ray tubes which is applied to the target for rotating anode X-ray tubes, especially can emit the X-ray of two or more kinds of quality of radiation.

**[0002]**

[Description of the Prior Art] When performing various kinds of roentgenography, there is a case where he wants to change the quality of radiation of the X-ray to emit. In order to generate conventionally the X-ray with which two or more kinds of quality of radiation differs from one X-ray tube, it was carried out by adding the filter of an ingredient which is different in the direction of X-ray emission of an X-ray tube as indicated by JP,41-17814,B.

**[0003]**

[Problem(s) to be Solved by the Invention] The above-mentioned conventional technique was not taken into consideration about the problem of the line type of the X-ray emitted from the problem and X-ray tube of withstand voltage at the time of attaching a filter. That is, when it approaches and a filter is attached near the front face of an X-ray tube, poor withstand voltage may arise, and if an insulation is strengthened, the problem which equipment enlarges will arise. Moreover, about the X-ray emitted, since the X-ray from which a filter is added and wavelength distribution differs according to the difference of an absorption coefficient will be obtained, there is a problem of decrease of that the line type of an X-ray is restricted and X dosage. The object of this invention is to cope with these troubles and offer the target for rotating anode X-ray tubes which can make stability generate the X-ray of the desired quality of radiation, without enlarging equipment.

**[0004]**

[Means for Solving the Problem] In order to attain the above-mentioned object, in a rotating anode X-ray tube target, the focal plane of the shape of a ring which consists of construction material from which plurality differs is established on a target base material. Furthermore, in a rotating anode X-ray tube, the above-mentioned target is provided, each of two or more focal planes of this target is countered, and cathode is prepared.

**[0005]**

[Function] By preparing the cathode which counters two or more focal planes and its each, the X-ray of the quality of radiation according to the construction material of a focal plane can be generated. At this time, the X-ray of the desired quality of radiation is obtained by preparing each cathode and the filter corresponding to focal plane construction material. Moreover, with the X-ray tube which applied this invention, although the number of cathode increases compared with the conventional X-ray tube, since such cathode is built in a bulb, the dimension of an X-ray tube becomes the same as the former.

Moreover, equivalent dependability is acquired from structure being the same as that of the conventional X-ray tube.

**[0006]**

[Example] Hereafter, an attached drawing explains one example of this invention. Drawing 1 is the sectional view of the target of one example of this invention. Drawing 3 is the important section sectional view of the X-ray tube which used the target of this invention. As for the target of drawing 1, the focal plane, the focal plane A1, and focal plane B-2 of the shape of two kinds of doughnuts are joined on the target base material 3. Molybdenum and graphite are used as a target base material 3. A focal plane A1 and focal plane B-2 consist of a different metal, for example, a tungsten, and molybdenum. The junction to a focal plane and the target base material 3 is forging or brazing, when the target base material 3 is molybdenum, and when the target base material 3 is graphite, it is performed with a CVD method etc. Although the number of focal planes explained two kinds of cases above, it can be carried out similarly more than it.

[0007] In drawing 2, the part which supports the anode plate possessing a target and two or more cathode counters in the vacuum envelope 6, and sealing is carried out. As cathode, the focal plane A1 of a target and focal plane B-2 are countered, and cathode A4 and cathode B5 are prepared. The electron beam from cathode A4 collides with a focal plane A1, and generates an X-ray, and the electron beam from cathode B5 collides with focal plane B-2, and generates an X-ray. In this case, since construction material differs, a focal plane A1 and focal plane B-2 generate the X-ray of the quality of radiation different, respectively. When emitting an X-ray using the X-ray tube of this invention, a focal plane is selected according to a photography application, and high tension is impressed between the cathode and the targets which counter the focal plane. The X-ray of the quality of radiation which suited the application as a result is emitted. Moreover, it is desirable to prepare the filter which suited the construction material of a focal plane out of an X-ray tube.

[0008] Drawing 2 is the sectional view of other examples of this invention. What is necessary is to join only a focal plane A1, since the part corresponding to focal plane B-2 of drawing 1 can use the inclined plane of the target substrate 3 as it is when the target substrate 3 is used as molybdenum. In the target of this invention, a shallow slot is established in the part which joins a focal plane A1, a focal plane A1 is fitted in into it, and it joins by forging or brazing.

[0009]

[Effect of the Invention] According to this invention, since the selection activity of the X-ray of a suitable line type can be carried out according to a photographic subject with one X-ray tube, the improvement in image quality by improvement in contrast, prevention of a fogging, etc. is attained. Moreover, since one equipment can attain the function of two or more equipments, reduction of cost can also be performed.

---

[Translation done.]

**\* NOTICES \***

JPO and INPIT are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

**CLAIMS**

---

**[Claim(s)]**

[Claim 1] The target for rotating anode X-ray tubes characterized by establishing the focal plane of the shape of a ring which consists of construction material from which plurality differs on a target base material.

[Claim 2] The rotating anode X-ray tube characterized by having provided the target of claim 1, having countered each of two or more focal planes of this target, and preparing cathode.

---

[Translation done.]

**\* NOTICES \***

JPO and INPIT are not responsible for any  
damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

**DESCRIPTION OF DRAWINGS**

---

**[Brief Description of the Drawings]**

[Drawing 1] It is the sectional view of the target of one example of this invention.

[Drawing 2] It is the sectional view of the target of other examples of this invention.

[Drawing 3] It is the important section sectional view of the X-ray tube using the target of this invention.

**[Description of Notations]**

- 1 Focal Plane A
- 2 Focal Plane B
- 3 Target Base Material
- 4 Cathode A
- 5 Cathode B

---

[Translation done.]

**\* NOTICES \***

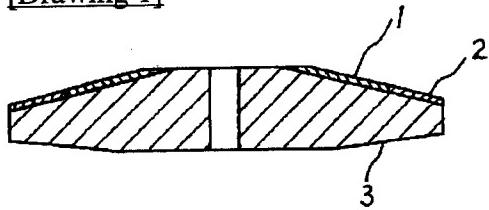
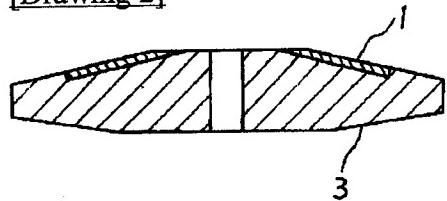
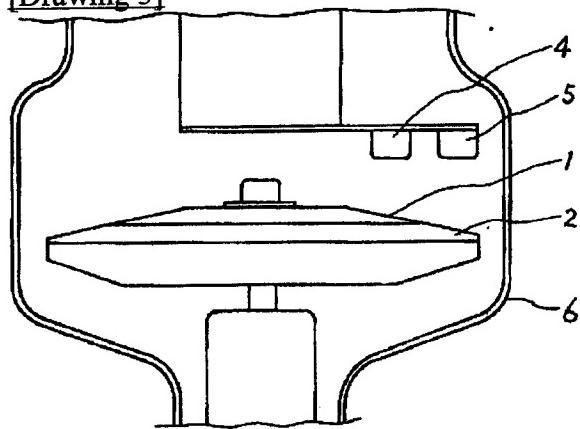
JPO and INPIT are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

**DRAWINGS**

---

**[Drawing 1]****[Drawing 2]****[Drawing 3]**

---

[Translation done.]